Chemistry Industry Economic Profile 2017

CHEMISTRY INDUSTRY
ASSOCIATION OF CANADA

Responsible Care®
Our commitment to sustainability.

CHEMISTRY INDUSTRY
ASSOCIATION OF CANADA

The Chemistry Industry Association of Canada (CIAC) is the voice of Canada's $53 billion chemistry industry and represents more than 50 members and partners across the country. The industry employs 86,700 Canadians and supports another 520,000 jobs in Canada.

Members of CIAC are signatories to Responsible Care® – the association's U.N.-recognized sustainability initiative. Responsible Care® inspires its members to take actions that improve the sustainability of their operations and reduces harm throughout the entire life cycle of their products.

Contents

President's Message

I am pleased to present to you the ***Chemistry Industry Association of Canada's*** (CIAC) 2017 ***Chemistry Industry Economic Profile***.

Canada's $53 billion chemical manufacturing industry is a significant contributor to our country's economy. The sector is directly responsible for 86,700 jobs and pays over $6 billion in salary and wages. Primarily concentrated in Alberta, Ontario and Quebec, the industry supports 520,000 jobs in other manufacturing sectors across the country.

The value of "chemistry" to Canada's economy is not fully appreciated by many. The fact is that more than 95 per cent of all goods manufactured rely on chemistry. It is an integral part of our everyday life – from the homes we live in, to the cars we drive, the food we eat and the electronic devices we so heavily rely on.

In 2016, the industry saw a three per cent increase in shipments, with growth in all regions of the country.

This annual review and the accompanying executive summary provides readers with an economic profile of the industry as well as quantitative insight into the industry's importance to our country's economy, and to all Canadians.

Yours sincerely,

Bob Masterson
President and CEO
Chemistry Industry Association of Canada

Introduction[1]

Using data from Statistics Canada (unless otherwise stated), CIAC's Annual Industry Economic Profile provides a statistical review of various key industry indicators including number on shipments, imports, exports, and employment. The report also includes a section on specialty chemicals, statistics for the key provinces of Quebec, Ontario and Alberta, and for the segments of the industry of primary interest to CIAC members.

This report is prepared by the Association's Business and Economics (B&E) team. The B&E team provides ongoing economic analysis of government policy initiatives, business trends and changing industry dynamics. The team also publishes national and provincial scorecards[2] that detail the state of policy initiatives and their effects on the industry and a Year-End Survey of Business Conditions,[3] an economic forecast based on CIAC members' sales trade and employment indicators.

Industrial classification

Industries in Canada are classified according to the 2012 North American Industrial Classification System (NAICS). This classification is maintained by Statistics Canada and its counterpart organizations in the United States and Mexico. The chemical manufacturing subsector is captured in NAICS 325 which comprises establishments primarily engaged in manufacturing chemicals and chemical products, from organic and inorganic raw materials.

NAICS 325 includes the following sub-industry groups:

- Basic chemicals (NAICS 3251)
- Synthetic resins, rubbers, and synthetic fibres (NAICS 3252)
- Pesticides and fertilizers (NAICS 3253)
- Pharmaceuticals (NAICS 3254)
- Paints, coatings and adhesives (NAICS 3255)
- Soaps, cleaning compounds and toilet preparations (NAICS 3256)
- Other chemical products (NAICS 3259)

This report focuses on statistics for the overall chemical industry (NAICS 325), and for the combination of NAICS 3251 and 3252 which are collectively referred to as industrial chemicals.

- NAICS 3251 Basic chemicals - comprises establishments primarily engaged in manufacturing organic and inorganic chemicals, using basic processes such as thermal cracking, distillation, and chemical reaction.

[1] This publication intends to provide the best information available. However, neither CIAC nor its employees make any warranty, expressed or implied, or assumes any liability or responsibility for any use, or the results of such use, of any information or data disclosed in this report.

[2] http://canadianchemistry.ca/index.php/en/fact-sheets-brochures

[3] http://canadianchemistry.ca/index.php/en/publications

- NAICS 3252 Synthetic resins, rubbers, and fibres - comprises establishments primarily engaged in manufacturing polymers such as polyethylene, butyl rubbers, polyamides, and fibres made from these resins. Polymerization of monomers into polymers, for example, ethylene into polyethylene, is the basic process.

For more information about this report:

David Podruzny
Vice President, Business and Economics
dpodruzny@canadianchemistry.ca
(613) 237-6215 ext. 229

David Cherniak
Senior Policy Analyst, Business and Economics
dcherniak@canadianchemistry.ca
(613) 237-6215 ext. 231

Chemistry industry at a glance

Chemical industry[4] shipments in Canada in 2016 were $53 billion, exports were $39 billion and imports totaled $53 billion.

The industry employed 86,700 workers in 2016 which constituted 5.7 per cent of all manufacturing jobs. In addition to the direct jobs, other jobs are supported by the purchasing activity of the chemistry industry and by the subsequent expenditure-induced activity. CIAC has estimated that for every job in the chemistry industry, another 5 indirect jobs are created in other parts of the economy, so in total the chemistry industry supports 520,000 jobs in Canada.

Industrial chemicals[1] is a keystone industry within the Canadian economy. It converts and adds value to raw resources such as natural gas, crude oil, minerals, metals and biomass, creating intermediate products that are used as inputs by other parts of the chemistry industry, and by almost all other manufacturing segments. Major consumer industries include: plastic and rubber products (NAICS 326), forest products (NAICS 321 and 322), transportation equipment (NAICS 336), oil and gas extraction (NAICS 211), clothing (NAICS 315), construction (NAICS 23), and pharmaceuticals (NAICS 3254). For industrial chemicals, shipments in 2016 were $26 billion, exports were $19 billion, imports were $19 billion, and employment was 17,500.

Table 1: Chemical industry statistics

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Shipments, $ billion	48.2	49.7	40.1	43.4	47.1	48.6	49.7	52.2	51.7	53.1
Employment, 000	78.1	80.9	78.4	81.4	79.8	83.6	84.5	85.5	86.4	86.7
Imports, $ billion	40.4	42.1	39.9	40.8	43.4	44.4	46.4	50.3	53.7	53.3
Exports, $ billion	32.3	32.0	26.5	27.8	31.3	29.6	32.0	35.5	38.1	38.7



Table 2: Industrial chemical statistics

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Shipments, $ billion	26.2	27.1	18.3	22.0	25.3	24.7	25.5	25.6	25.2	25.6
Employment, 000	17.8	18.1	16.1	17.2	17.2	17.2	17.4	17.5	17.7	17.5
Imports, $ billion	17.1	17.5	13.8	15.9	17.1	17.3	17.9	19.3	19.7	18.8
Exports, $ billion	19.7	18.4	13.2	15.7	18.6	17.0	18.7	19.8	19.2	18.7

[4] Chemical industry and industrial chemicals are defined on page 1.

Manufacturing shipments (revenue)

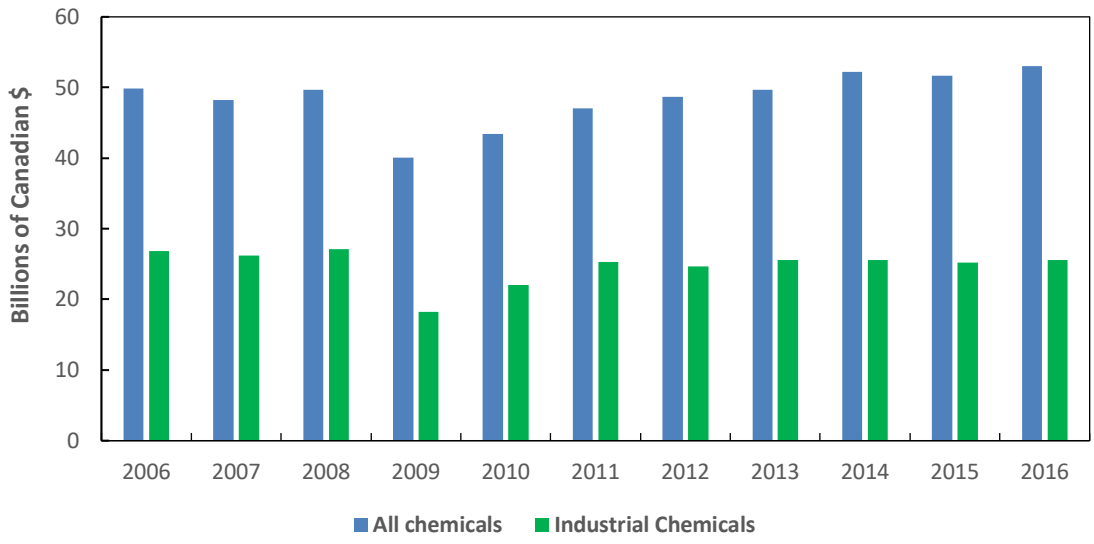
In 2016, the value of the Canadian chemical industry manufacturing shipments was $53 billion, an all-time high, and an increase of 3 per cent compared to 2015.

Shipments of industrial chemicals were $26 billion in 2016, representing an increase of 2 per cent compared to 2015 (Table 3, Figure 1). Shipments for industrial chemicals have remained within a narrow band over the past five years.

Table 3: Manufacturing shipments

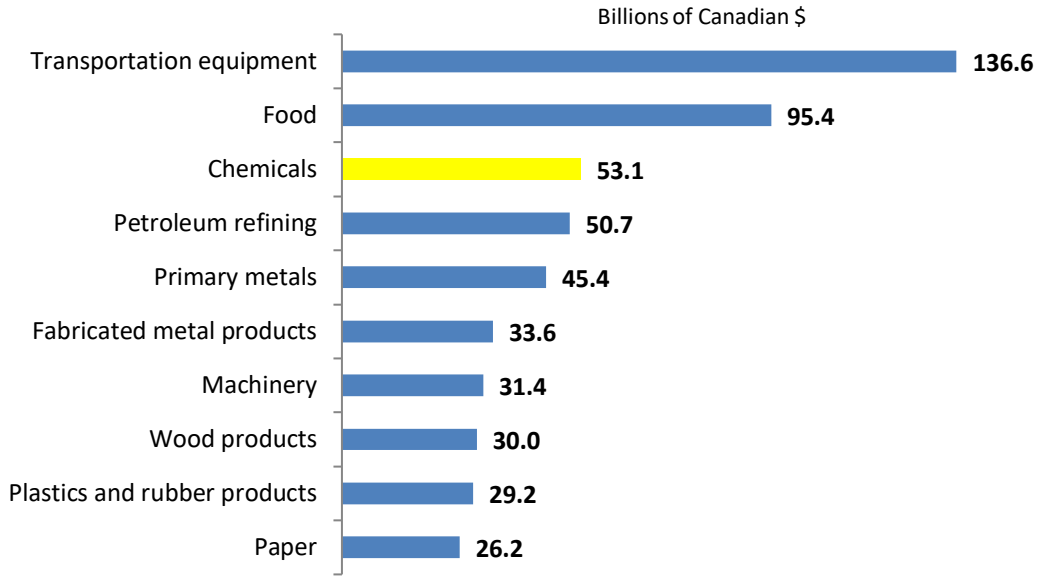
Manufacturing shipments, $ billion	2015	2016	Change 2015-16
All chemicals	51.7	53.1	2.7%
Industrial chemicals	25.2	25.6	1.7%

Figure 1: Chemical industry shipments



Within the NAICS system, there are 21 manufacturing industries at the 3-digit level. Among these industries, chemicals (NAICS 325) ranks as the 3rd largest based on value of shipments (Figure 2).

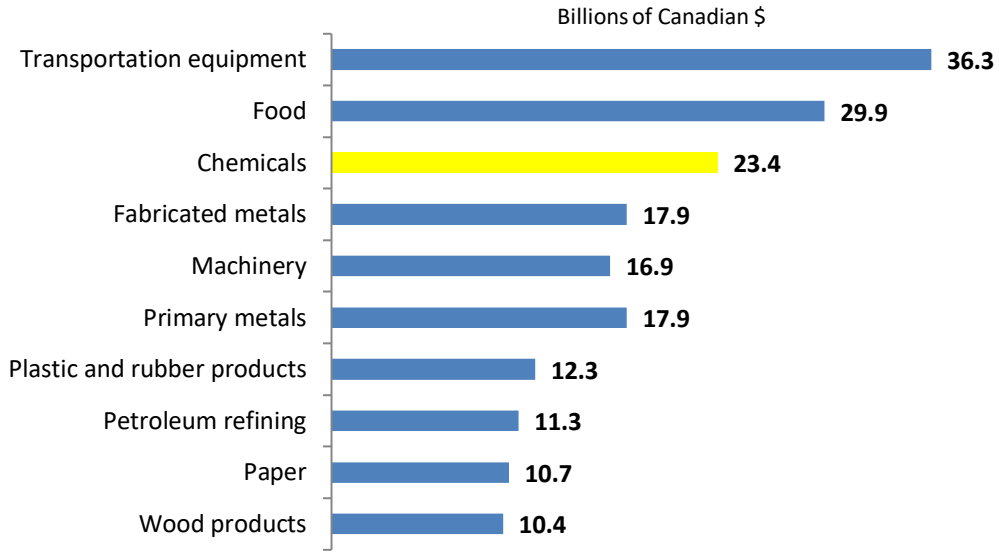
Figure 2: Top 10 manufacturing industries by value of shipments



Value added

Value added measures the value of output of an industry less the value of intermediate inputs required in the production process. Compared to all manufacturing industries, chemicals ranked 3rd based on value added in 2015 (latest available, Figure 3).

Figure 3: Top 10 manufacturing industries by value added



Employment

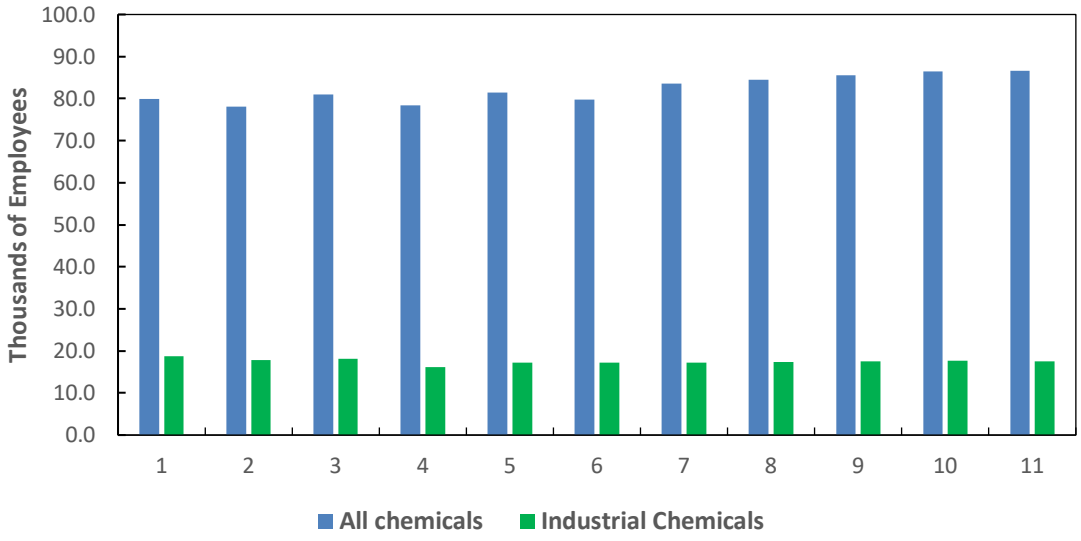
The chemical industry employed 86,700 workers in 2016. For industrial chemicals, the figure was 17,500. For both groupings, employment peaked in 2003 and has tended to decline since, although levels have been mostly flat in recent years (Table 4 and Figure 4).

In addition to the direct jobs, additional jobs are supported by the purchasing activity of the chemical industry and by the subsequent expenditure-induced activity. For every job in the chemical industry, it is estimated that another five jobs in other sectors are indirectly linked to the industry. On this basis, the chemical industry supports about 520,000 jobs in the overall Canadian economy.

Table 4: Employment in the Canadian chemical industry

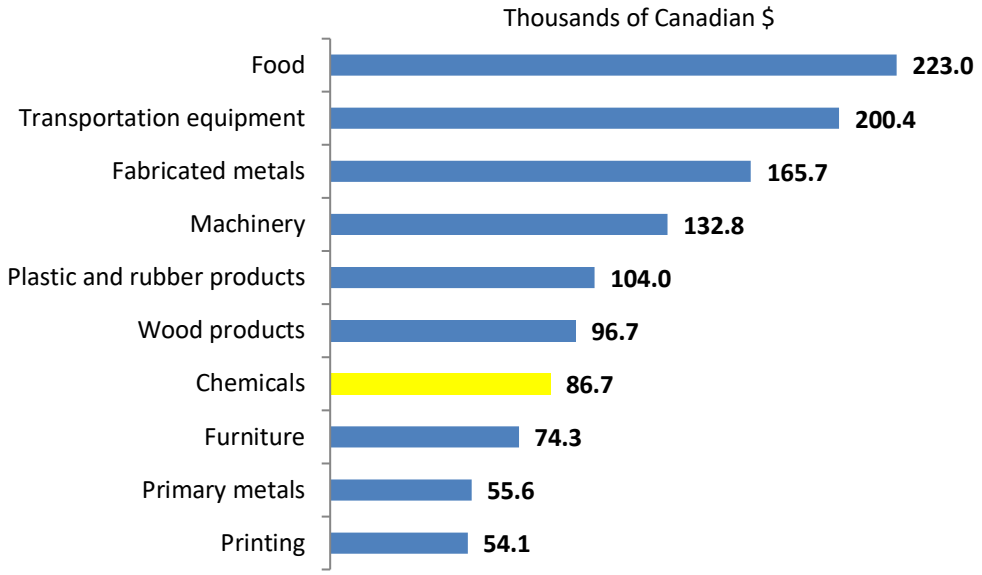
Total employment, thousand	2015	2016	Change 2015-16
All chemicals	86.4	86.7	0.3%
Industrial chemicals	17.7	17.5	-0.7%

Figure 4: Chemical industry employment



On the basis of employment, chemicals rank 7th among all manufacturing industries (Figure 5).

Figure 5: Top 10 manufacturing industries by employment



Salaries and wages

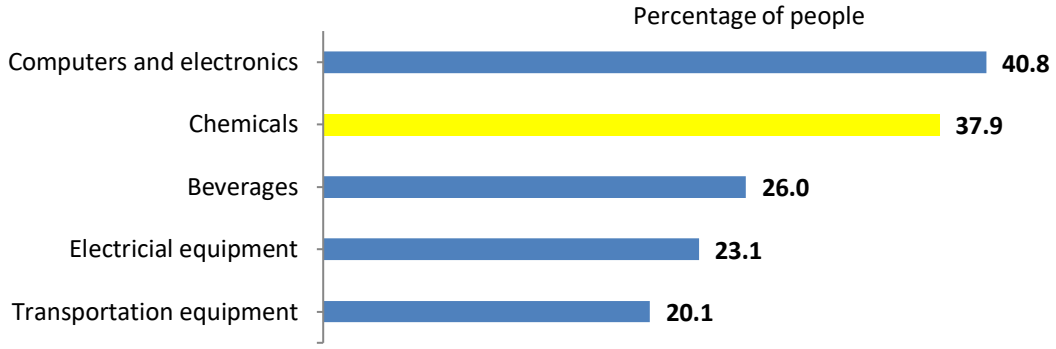
Total salaries and wages paid to employees in the chemical industry in 2016 were $5.4 billion, with $1.4 billion paid in the industrial chemical segment (Table 5).

Table 5: Total salary and wages paid by the chemical industry

Total salaries and wages, $ billion	2015	2016	Change 2015-16
All chemicals	5.7	5.4	-4.5%
Industrial chemicals	1.5	1.4	-3.4%

Chemical companies operate a variety of types of complex equipment and processes using sophisticated computer control technologies. Employees require specialized education and training to operate these processes safely and efficiently. As a result, the chemical industry's proportion of employees with a university degree (38 per cent) is second only to the computer and electronic products industry (Figure 6), and chemicals has the highest proportion of employees with post-graduate degrees.

Figure 6: Top 5 manufacturing industry by proportion of employees with university degree



Chemicals ranked 6th among all manufacturing industries with an average salary of $62,300 (Figure 7). For overall manufacturing, the average salary in 2016 was $55,100. Within industrial chemicals the average salary was higher still at $81,500.

Figure 7: Top 10 manufacturing industries based on average earnings per employee

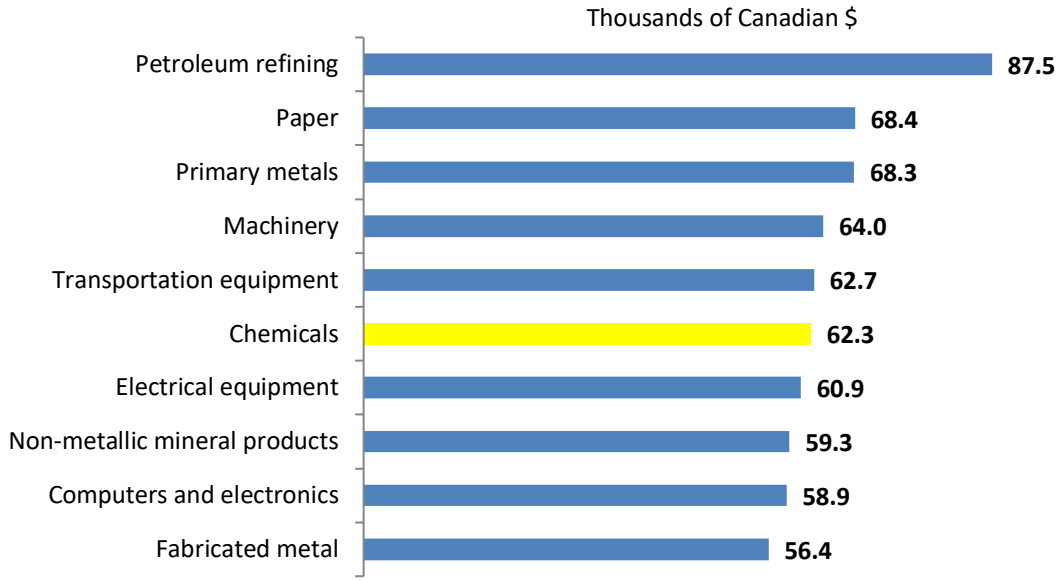


Table 6: Average salaries in the chemical industry

Average salaries and wages, $ thousand	2015	2016	Change 2015-16
All chemicals	65.4	62.3	-4.8%
Industrial chemicals	83.9	81.5	-2.8%

International trade

Canada exported $39 billion worth of chemicals and chemical products to the world in 2016, an increase of 1 per cent from 2015. Imports decreased by 1 per cent to $53 billion (Table 7 and Figure 8). The United States represents the dominant export market and the dominant source of imports. In 2016, 78 per cent of exports went to the United States and 62 per cent of imports originated there. The next largest export markets were: China (4 per cent), followed by Japan and Mexico (2 per cent each). The next largest sources of imports were: Germany (6 per cent), Switzerland (5 per cent), and China (3 per cent).

For industrial chemicals, Canadian exports in 2016 were $19 billion, a decrease of 3 per cent from 2015. Imports were $19 billion, a drop of 5 per cent (Table 7 and Figure 9). The United States is the primary trading partner, receiving 78 per cent of exports and responsible for 70 per cent of imports. The next largest export markets were: China (7 per cent), Mexico (3 per cent) and Germany (2 per cent). The next largest sources of imports were: China (5 per cent), Germany (3 per cent), and Ireland (2 per cent).

Table 7: Trade in the chemistry industry

Value of trade, $ billion		2015	2016	Change 2015-16
All chemicals	**Imports**	53.7	53.3	-0.8%
	Exports	38.1	38.7	1.5%
Industrial chemicals	**Imports**	19.7	18.8	-4.8%
	Exports	19.2	18.7	-3.0%

Figure 8: Trade of all chemicals

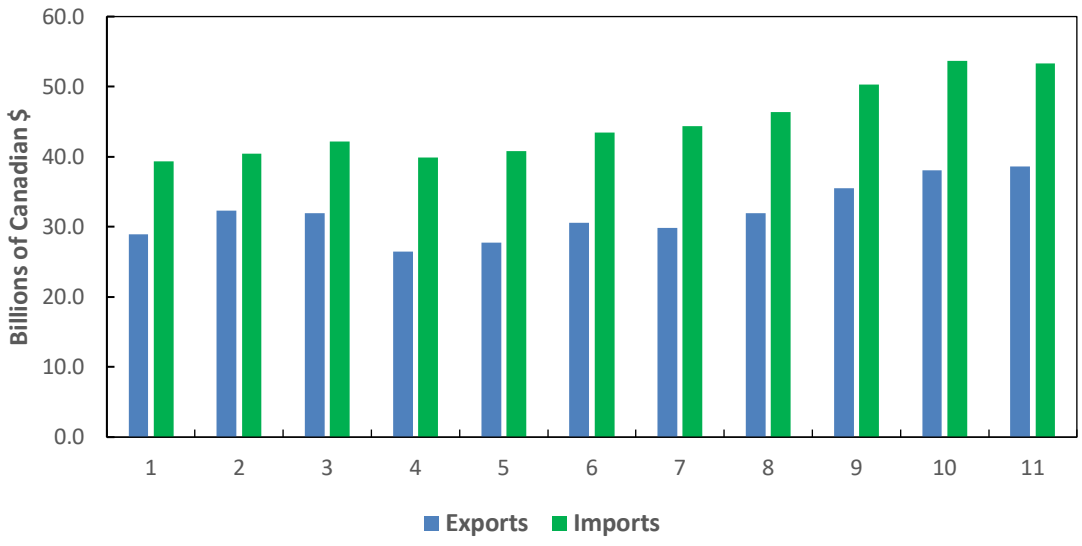
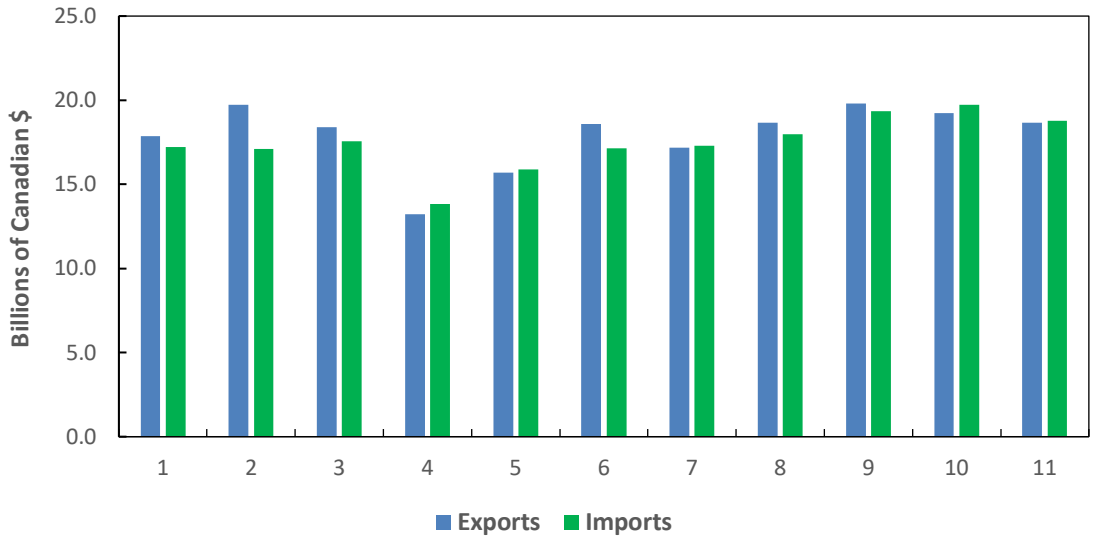
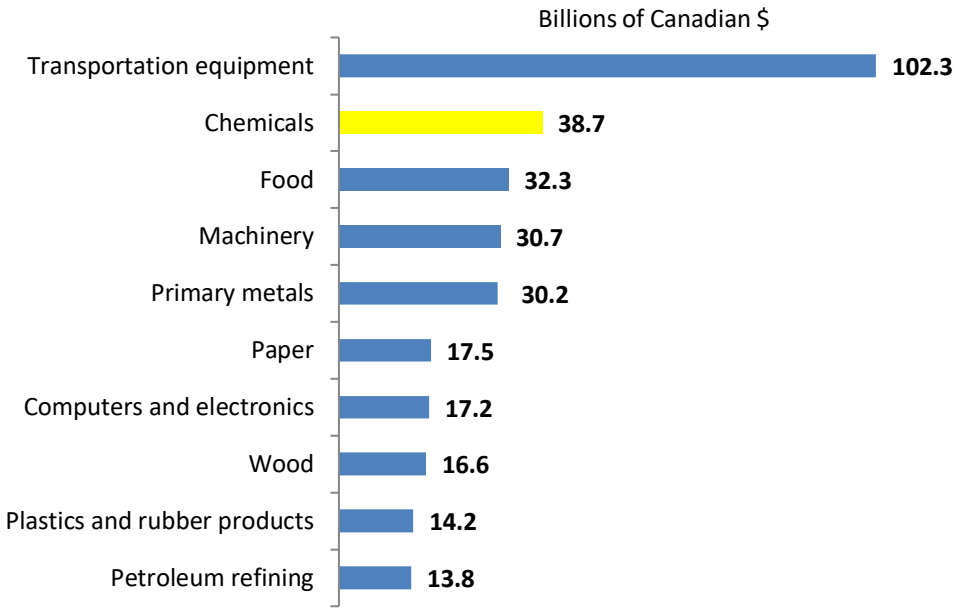


Figure 9: Trade of industrial chemicals



The chemistry industry is the 2nd largest exporter among all manufacturing industries (Figure 10)

Figure 10: Top 10 manufacturing industries by exports



Profits

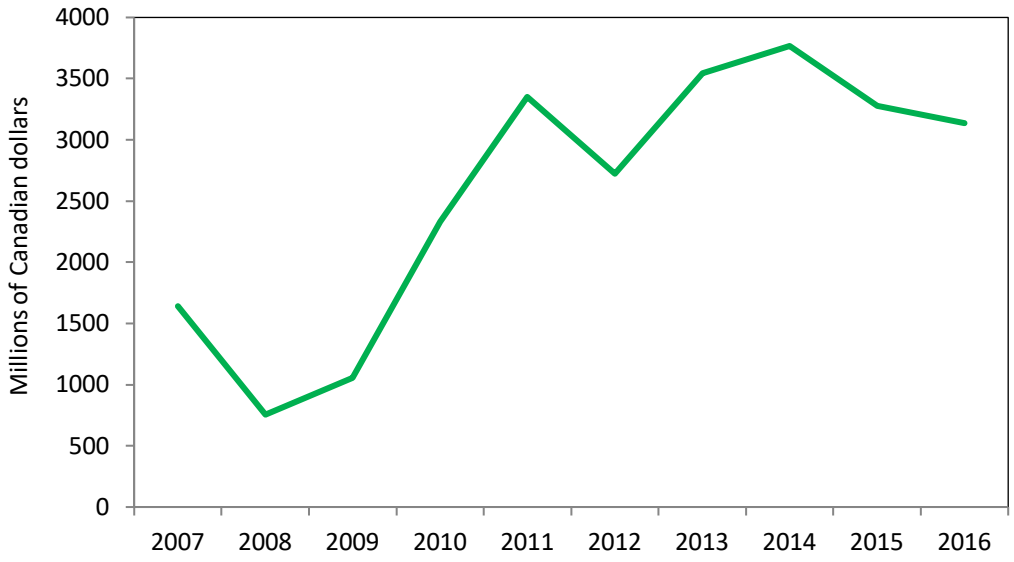
Profits for the chemical sector depend on factors such as capacity utilization, energy and raw material costs, supply-demand balance and competition with foreign producers. Operating profits for the chemical industry were $7.5 billion in 2016, and $3.1 billion for industrial chemicals (Table 8).

Table 8: Operating profits in the chemical industry

Operating profit, $ billion	2015	2016	Change 2015-16
Total chemicals	7.6	7.5	-0.3%
Industrial chemicals	3.3	3.1	-4.3%

Operating profits for industrial chemicals over the past 10 years show that profits suffered during the great recession, recovered strongly in 2010 and 2011, and have remained solid since then (Figure 11).

Figure 11: Operating profits for industrial chemicals



Productivity

One measure of manufacturing productivity is the value of revenue per employee. For all chemicals, output per employee has declined over the past decade from $624,000 in 2006 to $612,000 in 2016 (Table 9). Output per employee is much higher for industrial chemicals reflecting the capital-intensive nature of the industry compared to chemicals overall. For industrial chemicals, output per employee has also been almost flat going from $1.43 million in 2006 to $1.46 million in 2016.

Table 9: Productivity

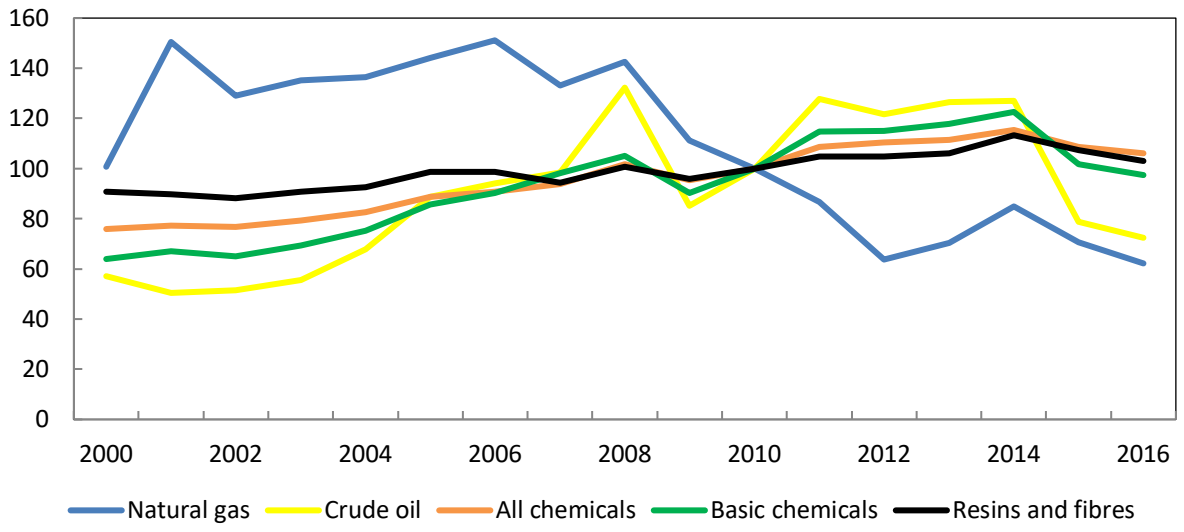
Output per employee, $ thousand	2006	2016
All chemicals	624	612
Industrial chemicals	1435	1461

Price Index

The Industrial Product Price Index (IPPI) reflects the prices that producers in Canada receive as the goods leave the plant gate.

Natural gas and crude oil are two important sources of feedstocks for the chemical industry. They have shown very different price behaviour in recent years. Natural gas prices rose dramatically until 2008, and have trended downward since then. The decline in gas prices has been driven primarily by the huge increases in North American supply coming from shale gas formations. By contrast, the crude oil price index trended upward until 2008, declined in 2009 due to the recession, climbed steeply again in 2010 and 2011, leveled off in 2012 and 2013, fell sharply in 2014 and 2015, before leveling off again in 2016 (Figure 12). All of the chemical indices showed small declines in 2016.

Figure 12: Price index, 2010=100

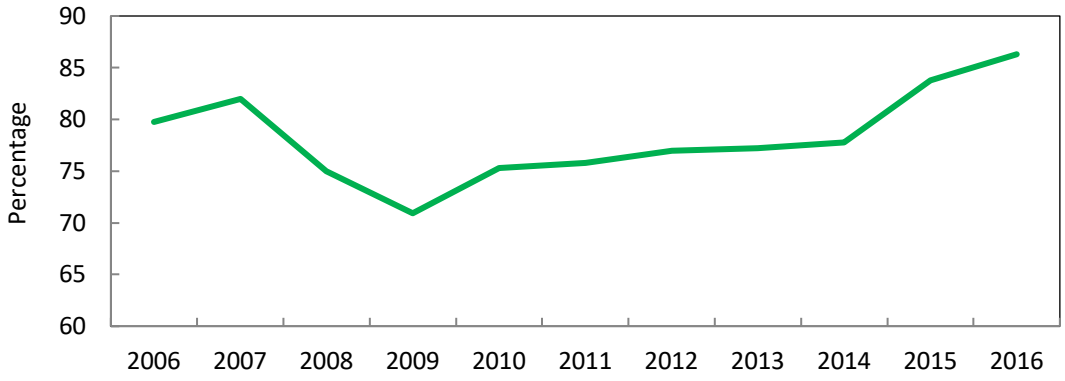


Capacity utilization

Capacity utilization refers to the extent to which an industry uses its installed productive capacity (Figure 13). Thus, it compares actual output with the maximum potential output that could be achieved if all capacity was fully used.

Capacity utilization for the overall chemical industry hit an all-time low of 68 per cent in the 1st quarter of 2009. Since then it has trended steadily upward, and averaged 86 per cent in 2016, the highest annual average since 1991. While separate data is not available for industrial chemicals, it would be expected to have utilization rates higher than the industry average since continuous production processes are employed, whereas the segment of the industry producing formulated products relies on batch processes.

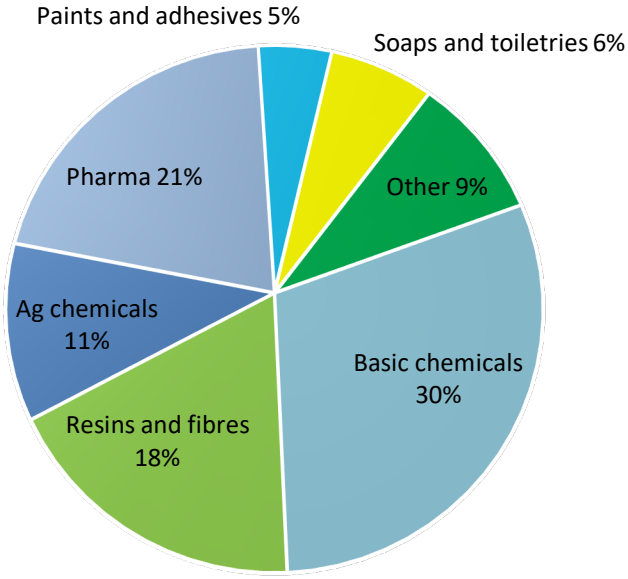
Figure 13: Capacity utilization in the overall chemical industry



Other chemical manufacturing subsectors

As mentioned previously, the Canadian chemical industry is comprised of seven sub-industries. Figure 14 shows the relative size of these industries by shipment value in 2016. Industrial chemicals accounted for almost half of the total industry.

Figure 14: Distribution by chemical sub-industries based on shipments



While NAICS 3251 and 3252 are the focus of this report, the following tables provide some data on the other sub-industries.

Table 10: Principal statistics for pesticides, fertilizers and other agricultural chemicals (NAICS 3253)

	Shipments, $ million	Employment	Imports, $ million	Exports, $ million
2010	3,869	4,161	1,974	1,594
2011	4,530	4,645	2,405	2,015
2012	4,819	5,235	2,700	2,141
2013	4,783	5,244	3,101	1,951
2014	5,279	5,253	3,358	1,715
2015	5,432	5,262	3,576	2,057
2016	5,743	5,191	3,400	1,891

Table 11: Principal statistics for pharmaceuticals (NAICS 3254)

	Shipments, $ million	Employment	Imports, $ million	Exports, $ million
2010	8,062	31,749	13,331	6,158
2011	7,742	30,249	13,597	5,895
2012	8,589	31,802	13,517	5,549
2013	8,549	31,987	13,706	6,054
2014	10,055	32,178	15,387	8,301
2015	9,876	32,363	16,855	10,468
2016	11,086	33,776	17,300	11,757

Table 12: Principal statistics for paints, coatings and adhesives (NAICS 3255)

	Shipments, $ million	Employment	Imports, $ million	Exports, $ million
2010	2,399	6,742	1,586	409
2011	2,145	6,111	1,633	474
2012	2,736	7,391	1,825	535
2013	2,672	7,596	1,902	528
2014	2,778	7,807	2,055	596
2015	2,678	8,012	2,322	725
2016	2,483	7,795	2,433	791

Table 13: Principal statistics for soaps, cleaning compounds and toilet preparations (NAICS 3256)

	Shipments, $ million	Employment	Imports, $ million	Exports, $ million
2010	2,788	10,724	4,303	2,183
2011	2,859	10,803	4,274	2,334
2012	3,133	11,236	4,566	2,447
2013	3,439	11,362	4,934	2,665
2014	3,200	11,481	5,312	2,907
2015	3,332	11,617	6,070	3,334
2016	3,540	11,721	6,394	3,460

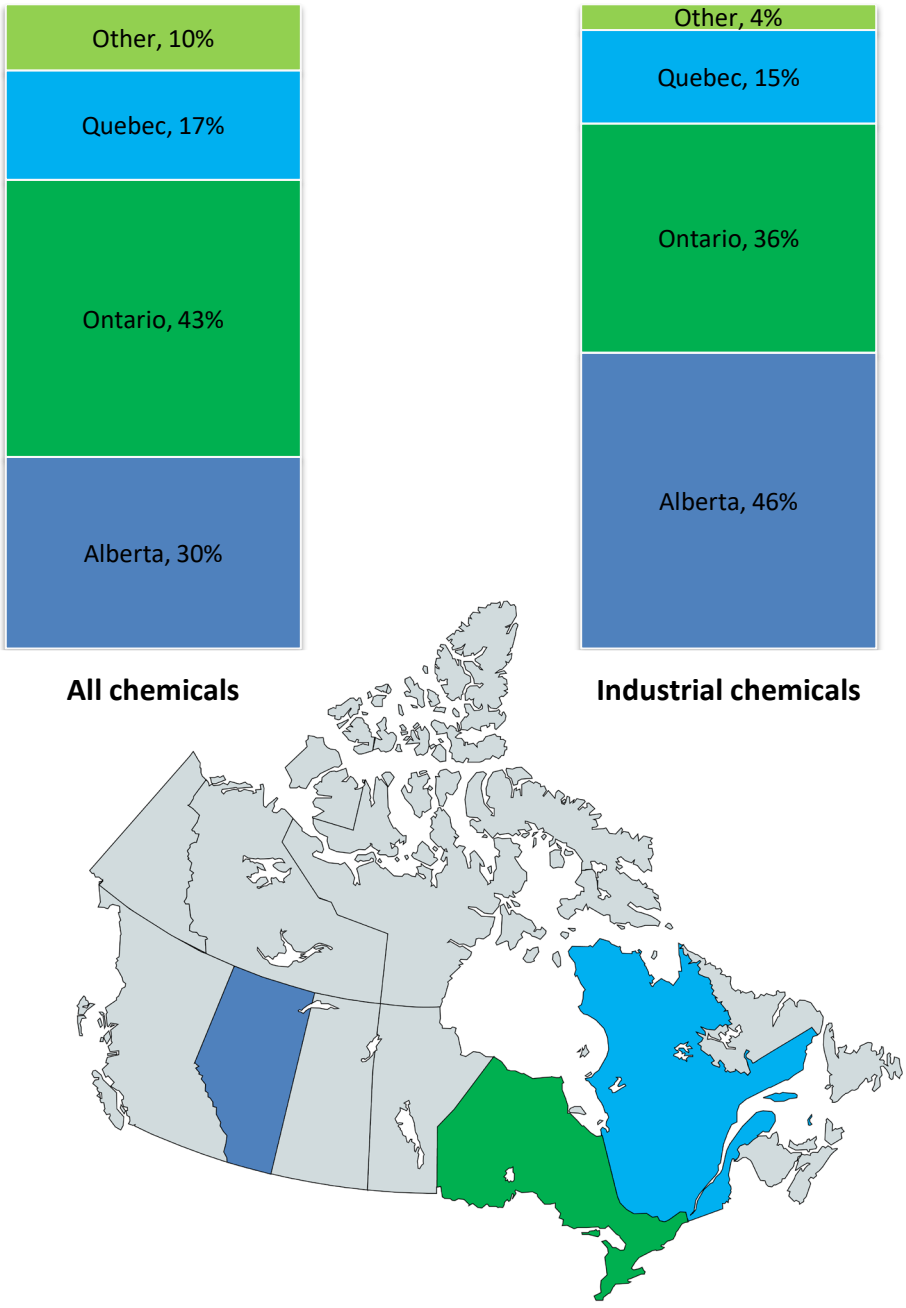
Table 14: Principal statistics for other chemical products (NAICS 3259)

	Shipments, $ million	Employment	Imports, $ million	Exports, $ million
2010	4,269	10,908	3,732	1,723
2011	4,521	10,759	4,363	1,913
2012	4,701	10,749	4,460	1,966
2013	4,698	10,994	4,798	2,055
2014	4,813	11,246	4,889	2,179
2015	4,861	11,491	5,149	2,254
2016	4,834	10.920	5,015	2,077

Provincial statistics

Both the overall chemical industry and the industrial chemicals segment are concentrated in the provinces of Ontario, Alberta and Quebec (Figure 15). Further information about these three main provinces is contained in the following portions of the analysis.

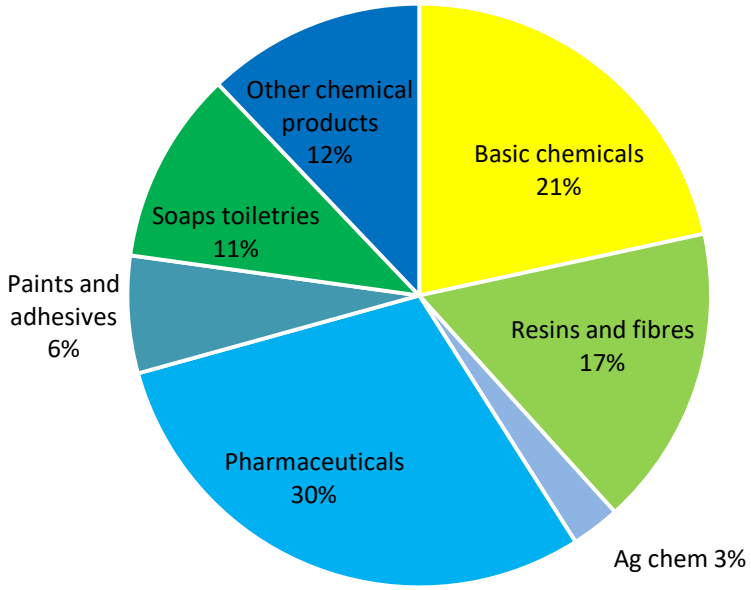
Figure 15: Provincial distribution of the chemical industry, by value of shipments



a. Ontario

In 2016, Ontario's chemical industry had shipments of $22 billion. Almost 40 per cent of these shipments were comprised of industrial chemicals (Figure 16).

Figure 16: Composition of the Ontario chemical industry



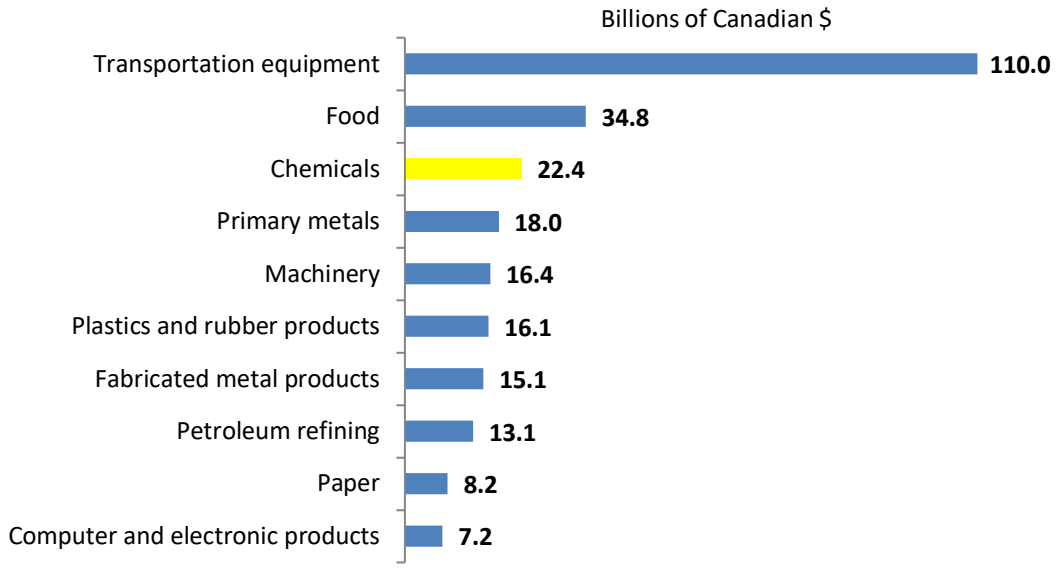
The value of industrial chemical shipments in 2016 was $9 billion (Table 15). The largest cluster for the industrial chemical industry is located in the Sarnia region, with the next largest concentrations in the Golden Horseshoe and along the St. Lawrence Seaway.

Table 15: Ontario chemical industry shipments

Shipments, $ billion	2015	2016	Change 2015-16
All chemicals	22.2	22.4	0.5%
Industrial chemicals	9.0	8.6	-4.4%

Chemicals was the 3rd largest of all manufacturing industries in the province in 2016, on the basis of shipments (Figure 17).

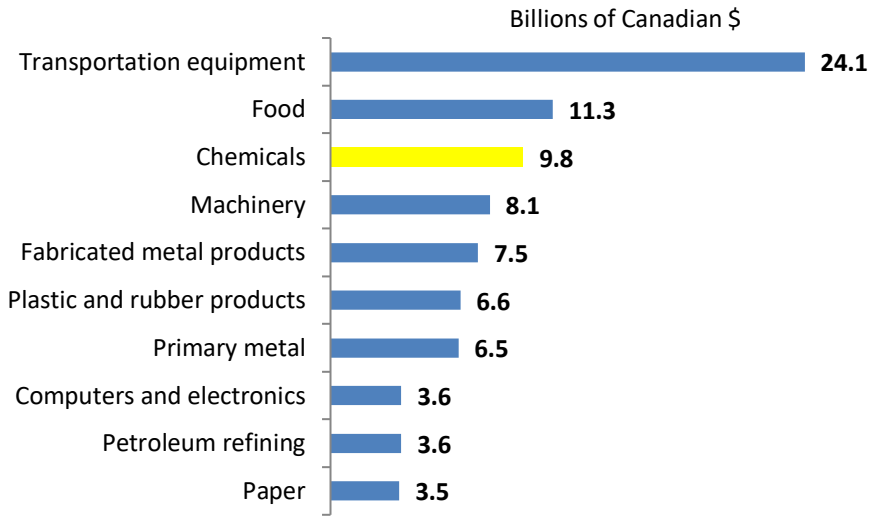
Figure 17: Top 10 manufacturing industries in Ontario by value of shipments



- ## Value added

On the basis of value added, chemicals also ranked 3rd among all manufacturing industries in 2015 (latest data available) (Figure 18).

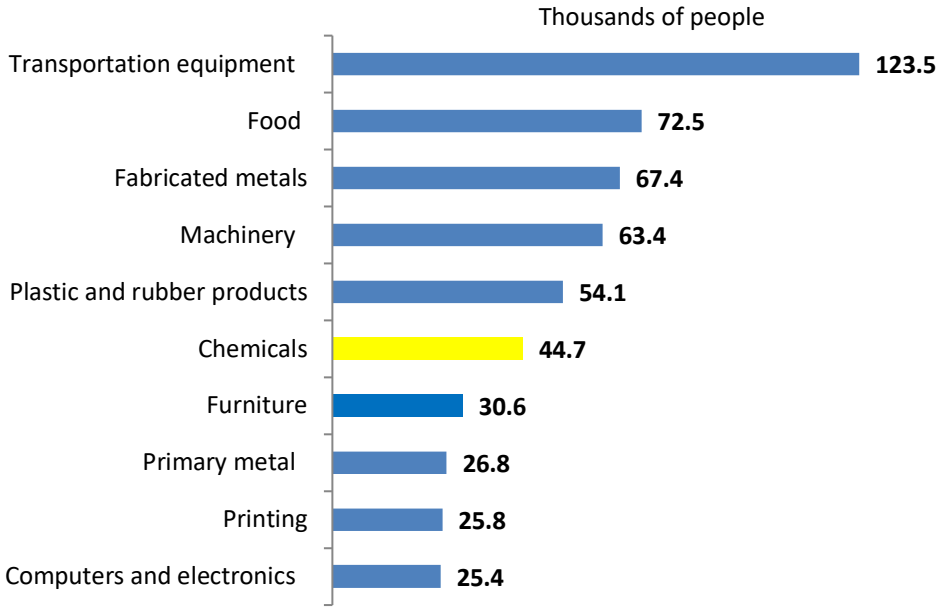
Figure 18: Top 10 industries by value added in Ontario



Employment ranking

The chemical industry directly employed 44,700 people in Ontario in 2016, up 0.7 per cent from 2015. When indirect employment is included, it is estimated that the chemical industry supports almost 270,000 jobs in the province. The number of employees working in industrial chemicals was 8,660, up 5.2 per cent compared to 2015, and representing 49 per cent of the national total. When compared to other manufacturing industries, chemicals ranked 6th on the basis of employment (Figure 19).

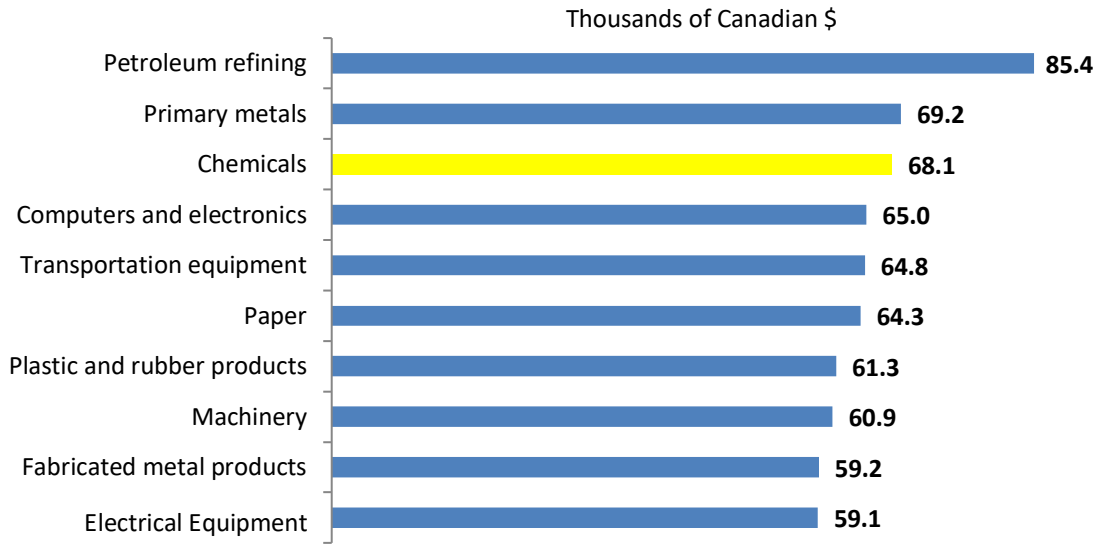
Figure 19: Top 10 manufacturing industries by employment in Ontario



Salaries and wages

The chemical industry paid a total of $3.0 billion in salaries and wages in the province in 2016. With an average annual salary of $68,100, the industry ranked 3rd among all manufacturing industries in Ontario (Figure 20). The average salary within industrial chemicals was much higher at $81,800. The average salary across all manufacturing industries in Ontario was $58,800.

Figure 20: Top 10 manufacturing industries by average salary in Ontario



• Trade

The value of exports by the chemical industry from Ontario in 2016 was $21 billion, while imports were $37 billion (Table 16). The United States was the destination for 76 per cent of exports, followed by Japan (3 per cent), then Italy, Brazil and Belgium (2 per cent each). The United States was also the source for most of the imports (63 per cent), followed by Switzerland (7 per cent), and Germany (5 per cent).

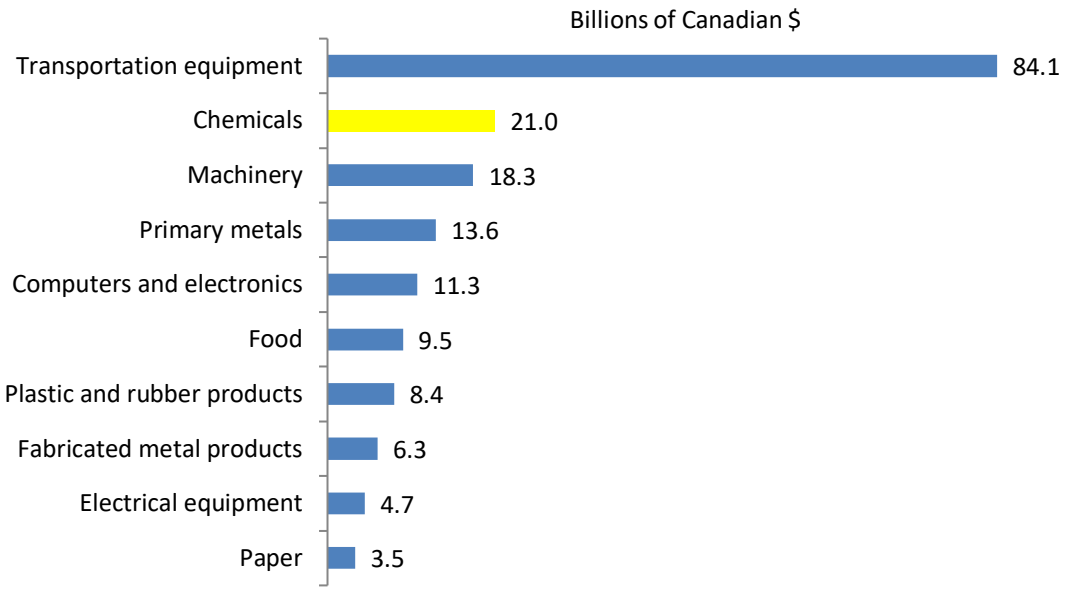
For industrial chemicals, exports from the province in 2016 were $8 billion, while imports were $12 billion. The United States was the destination for 78 per cent of exports, followed by China (3 per cent), and Germany, UK, Mexico and Netherlands (2 per cent each). The United States was also the source of most of the imports (75 per cent), followed by Ireland (3 per cent).

Table 16: Trade by the chemical industry in Ontario

Value of trade, $ billion		2015	2016	Change 2015-16
All chemicals	**Imports**	35.9	36.5	1.6%
	Exports	20.3	21.0	3.8%
Industrial chemicals	**Imports**	11.6	12.0	3.1%
	Exports	7.8	7.5	-4.4%

Chemicals is the 2nd largest exporter among all manufacturing industries (Figure 21).

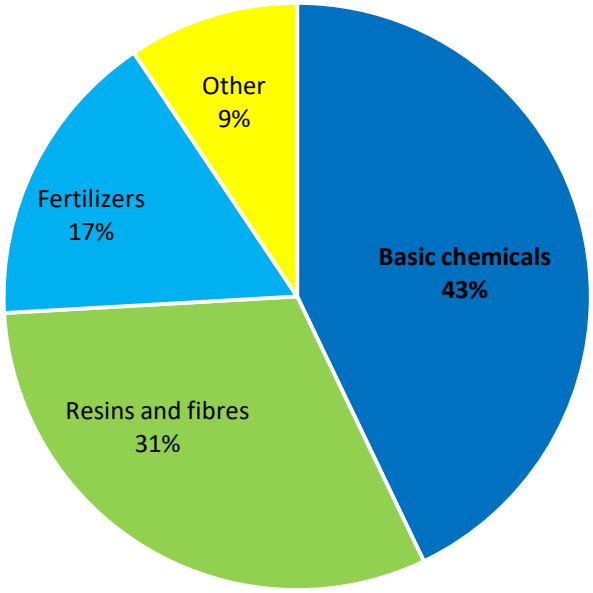
Figure 21: Top 10 manufacturing industries by value of exports from Ontario



b. Alberta

In 2016, Alberta's chemical industry had shipments of $16 billion (Table 17). Over three-quarters of the total was comprised of industrial chemicals (Figure 22).

Figure 22: Composition of the Alberta chemical industry



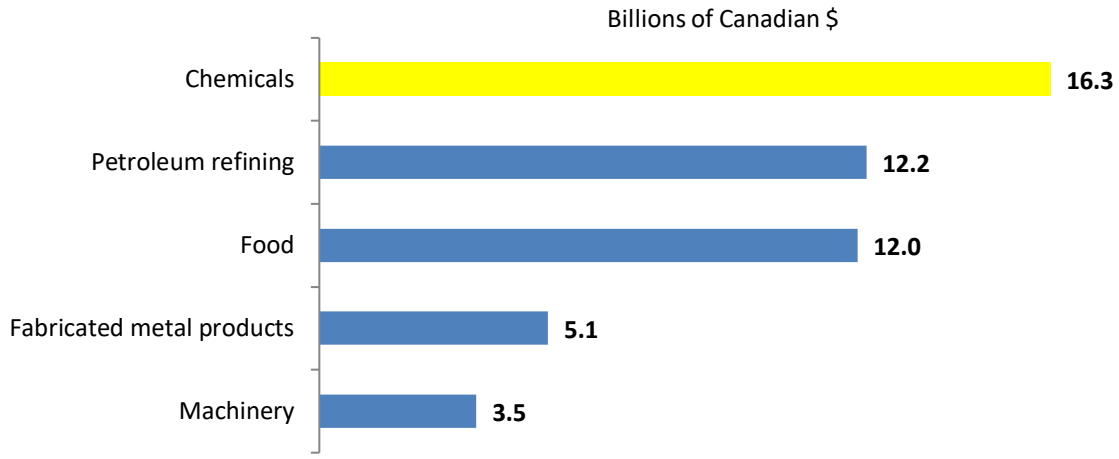
The value of industrial chemical shipments in 2016 was $12 billion. There are two main clusters for the industrial chemical industry in Alberta. One is the region to the northeast of Edmonton, and the second is situated in central Alberta, near Red Deer.

Table 17: Alberta chemical industry shipments

Shipments, $billion	2015	2016	Change 2015-16
All chemicals	15.4	16.3	6.0%
Industrial chemicals	11.6	12.0	4.2%

Chemicals ranked 1st among all manufacturing industries in the province in 2016, on the basis of value of shipments (Figure 23).

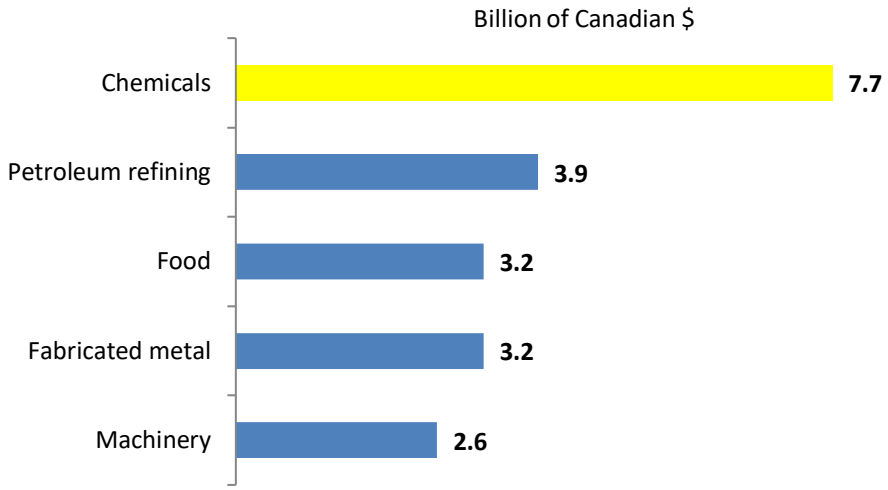
Figure 23: Top 5 manufacturing industries in Alberta by value of shipments[5]



- ## Value added

On the basis of value added, chemicals also ranked 1st among all manufacturing industries (Figure 24) based on 2015 data (latest available).

Figure 24: Top 5 industries by value added in Alberta

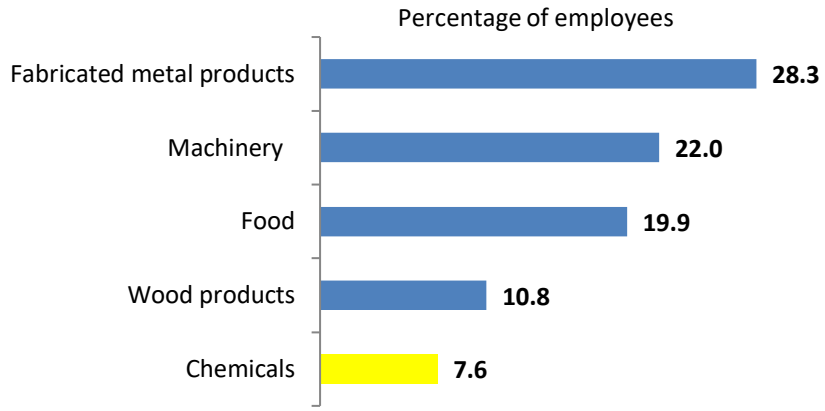


[5] The top 10 industries cannot be ranked because data for many industries has been suppressed by Statistics Canada.

Employment ranking

The chemical industry employed 7,600 people in Alberta in 2016, down 7 per cent compared to 2015. When indirect employment is included, it is estimated that the chemical industry supports about 45,000 jobs in the province. The number of employees working in industrial chemicals in 2016 was 3,970. When compared to other manufacturing industries in the province, chemicals ranked 5th (Figure 25).

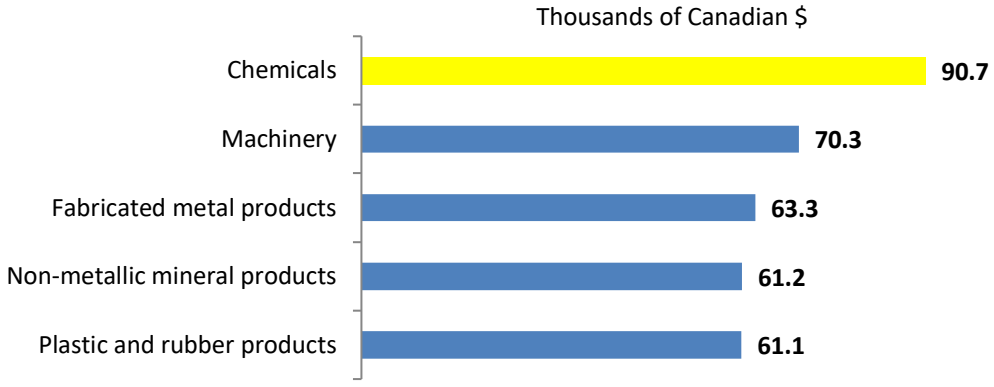
Figure 25: Top 5 manufacturing industries by employment in Alberta



Salaries and wages

The chemical industry paid a total of $680 million in salaries and wages in the province in 2016. The average salary paid to employees in the chemical industry was $90,700, which ranked 1st among all manufacturing industries (Figure 26). The average salary within industrial chemicals was higher still at $96,800. For all manufacturing the average salary in the province was $64,700.

Figure 26: Top 5 manufacturing industries by average salary in Alberta



Trade

The value of exports by the chemical industry from Alberta in 2016 was $8 billion, while imports were $2 billion (Table 18). The United States was the destination for 82 per cent of exports, followed by China (10 per cent) and Mexico (3 per cent). The United States was also the source of most imports (82 per cent), followed by China (4 per cent), and UK, Italy and Germany (2 per cent each).

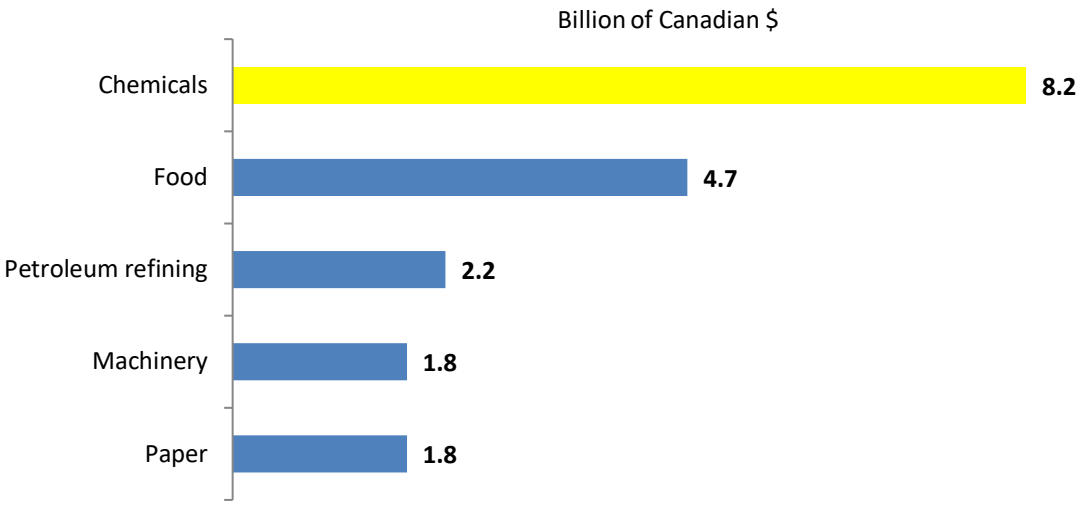
For industrial chemicals, exports from the province in 2016 were $7 billion, while imports were $1 billion. The United States was the destination for 79 per cent of exports, followed by China (12 per cent), and Mexico (4 per cent). The United States was the source of most imports (81 per cent), followed by China (6 per cent), and Italy (3 per cent).

Table 18: Trade by the chemical industry in Alberta

Value of trade, $ billion		2015	2016	Change 2015-16
All chemicals	**Imports**	2.7	2.4	-11.0 per cent
	Exports	8.5	8.2	-3.8%
Industrial chemicals	**Imports**	1.3	1.2	-7.9%
	Exports	7.0	6.8	-2.7%

Chemicals ranks 1st among manufacturing industries in terms of exports from Alberta (Figure 27). For all commodities, chemicals ranked 2nd behind crude oil and ahead of natural gas in 2015.

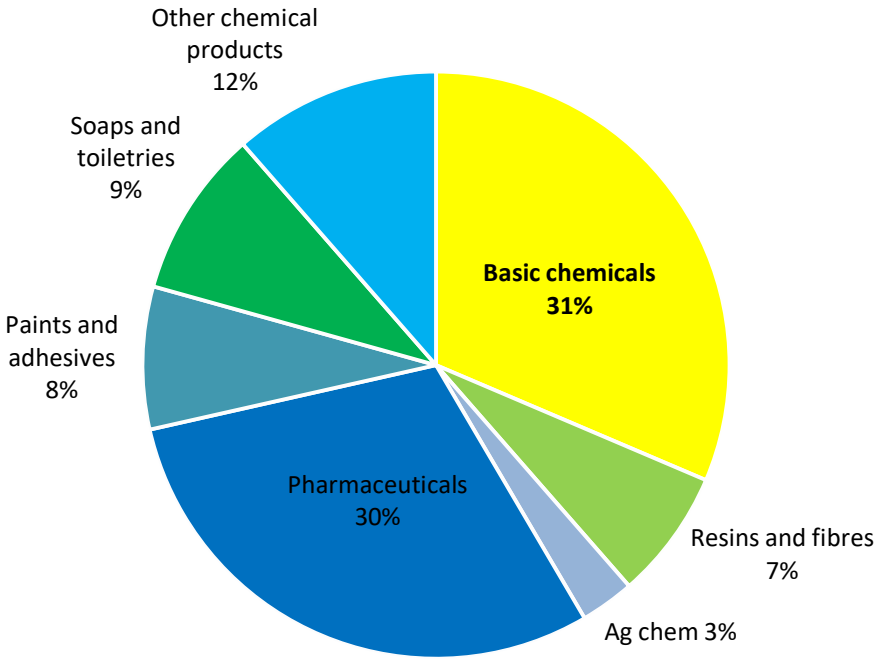
Figure 27: Top 10 manufacturing industries by value of exports from Alberta



c. Quebec

In 2016, Quebec's chemical industry had shipments of $9 billion and almost 40 per cent was comprised of industrial chemicals (Figure 28).

Figure 28: Composition of the Quebec chemical industry



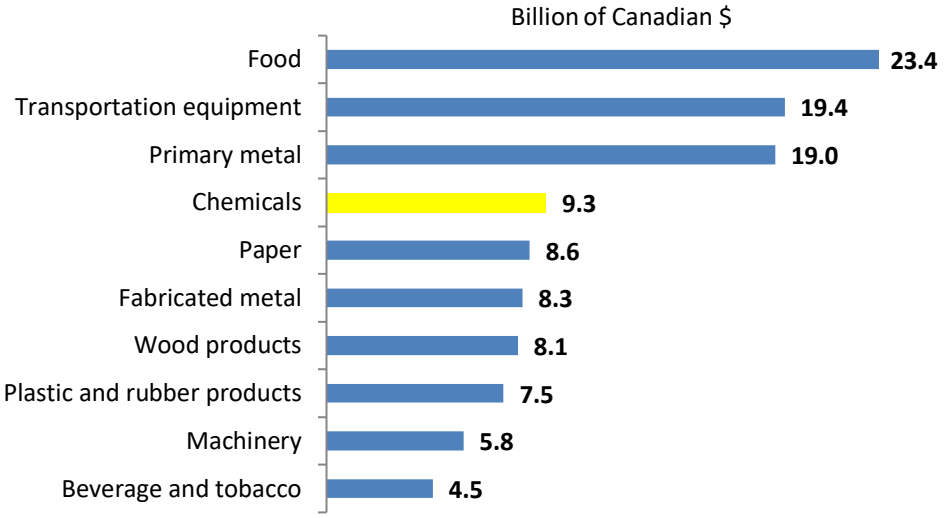
Shipments of industrial chemicals were $4 billion (Table 19). The industrial chemical industry in Quebec is concentrated in the eastern end of Montreal and along the south shore of the St. Lawrence River.

Table 19: Quebec chemical industry shipments

Shipments, $billion	2015	2016	Change 2015-16
All chemicals	8.7	9.3	6.2%
Industrial chemicals	3.6	3.6	-1.2%

Chemicals was the 4th largest manufacturing industry on the basis of shipments (Figure 29).

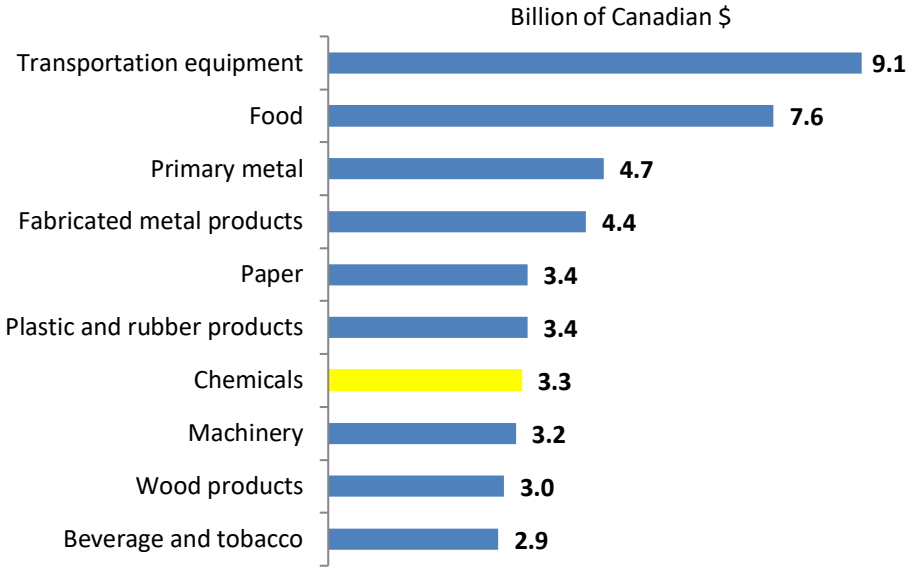
Figure 29: Top 10 manufacturing industries in Quebec by value of shipments



• Value added

On the basis of value added, chemicals ranked 7th among all manufacturing industries in Quebec (Figure 30).

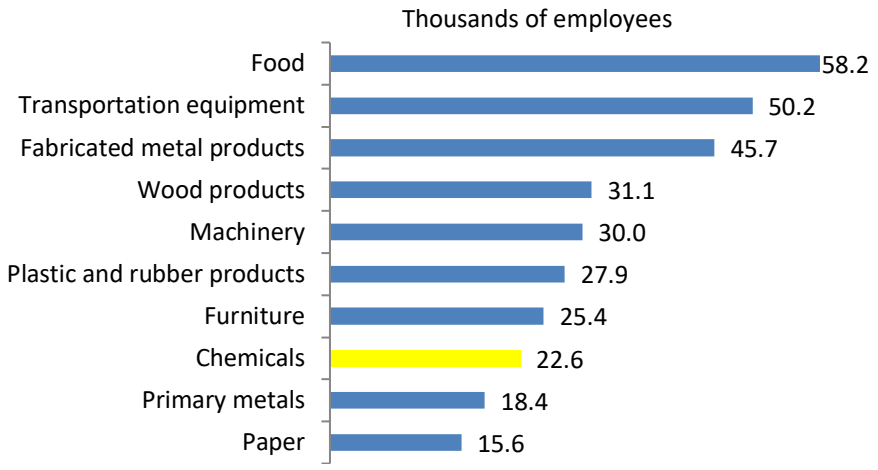
Figure 30: Top 10 manufacturing industries by value added in Quebec



• Employment ranking

The chemical industry employed 22,600 people in Quebec in 2016. When indirect employment is included, it is estimated that the chemical industry supports 135,000 jobs in the province. The industrial chemical industry employs 3,400 in the province. When compared to all manufacturing industries in the province, chemicals ranked 8th (Figure 31).

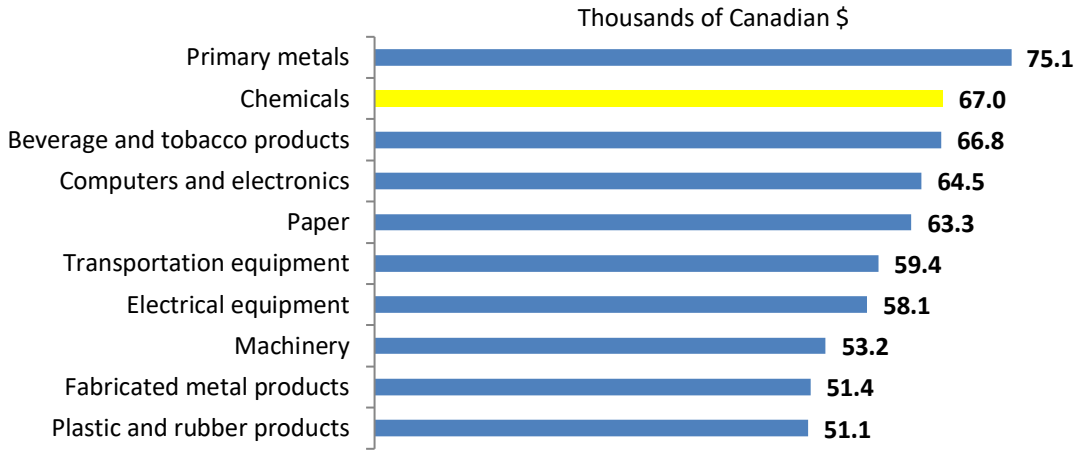
Figure 31: Top 10 manufacturing industries by employment in Quebec



• Salaries and wages

The chemical industry paid a total of $1.5 billion in salaries and wages in the province in 2016, corresponding to an average annual salary of $67,000, which placed the industry 2nd in Quebec (Figure 32). The average salary for industrial chemicals was $72,700. For all manufacturing, the average salary in the province was $52,000.

Figure 32: Top 10 industries by average salary in Quebec



Trade

The value of exports by the chemical industry from Quebec in 2016 was $6 billion and imports were $7 billion (Table 20). The United States was the destination for 77 per cent of exports, followed by Mexico (3 per cent), and Belgium and China (2 per cent each). Quebec is different from the other provinces in that a much lower proportion of its imports come from the United States (34 per cent), followed by Germany (13 per cent), Ireland and France (7 per cent each), and China (5 per cent).

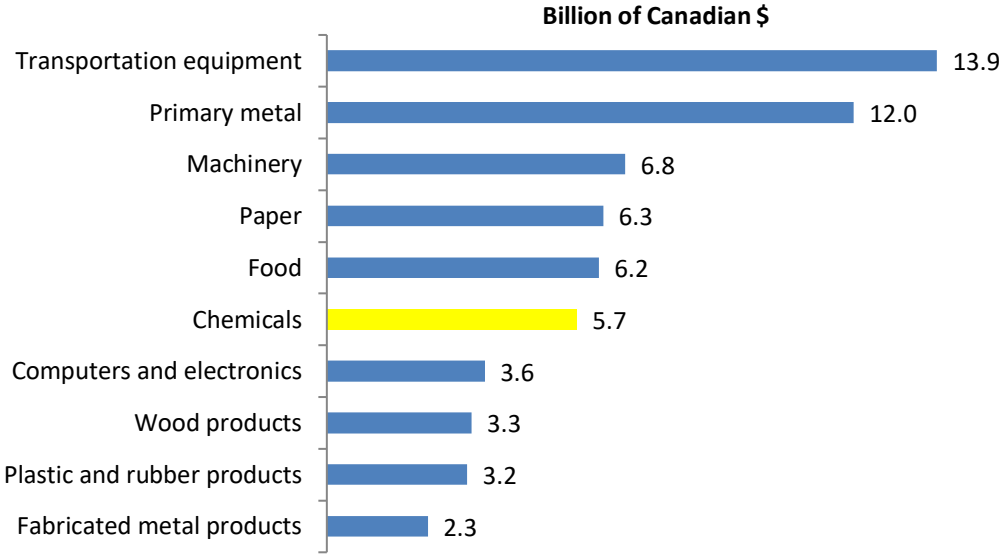
For industrial chemicals, exports from the province in 2016 were $3 billion, and imports were also $3 billion. The United States was the destination for 83 per cent of exports, followed by Mexico (4 per cent) and Spain (2 per cent). The United States was the source of 42 per cent of imports, followed by China (8 per cent), and Germany and Kazakhstan (6 per cent each).

Table 20: Trade by the chemical industry in Quebec

Value of trade, $ billion		2015	2016	Change 2015-16
All chemicals	**Imports**	8.0	7.4	-7.6%
	Exports	5.6	5.7	2.3%
Industrial chemicals	**Imports**	3.9	2.9	-27.1%
	Exports	2.5	2.5	no change

Compared to all other manufacturing industries, chemicals was the 6th largest export industry (Figure 33).

Figure 33: Top 10 industries by value of exports from Quebec, $ billion



Industry profiles

The segments of the chemical industry of primary interest to CIAC members are profiled according to the following categories:

- Petrochemicals and other organic chemicals
- Inorganic chemicals
- Synthetic resins, rubbers and fibres
- Specialty chemicals

a. Petrochemicals and other organic chemicals

Statistics Canada reports data on organic chemicals in two industry groups:

- NAICS 32511 – Petrochemicals
- NAICS 32519 – Other organic chemicals.

The petrochemicals industry only includes hydrocarbons. The main petrochemicals produced by CIAC members in Canada are ethylene, propylene, butylenes, butadiene, higher olefins, alkanes, benzene, toluene, xylenes, and styrene. Ethylene is the largest-volume petrochemical; it is always consumed very close to the point of production so almost none is traded.

Organic chemicals that contain atoms other than hydrogen and carbon are captured in the other organic chemicals industry. CIAC members are producers of all of the largest-volume chemicals in this category in Canada: methanol, isopropyl alcohol, and ethylene glycol.

Table 21: Principal statistics for petrochemicals and other organic chemicals

	2012	2013	2014	2015	2016
Establishments					
Petrochemicals	20	25	26	27	28
Other organic chemicals	135	135	135	140	133
Shipments $M					
Petrochemicals	7,080	6,789	7,011	5,591	5,485
Other organic chemicals	4,039	4,138	4,031	4,564	5,038
Employment					
Petrochemicals	1,186	1,407	1,636	1,857	1,855
Other organic chemicals	2,297	2,698	3,110	3,511	3,510
Exports $M					
Petrochemicals	2,301	2,597	2,874	1,839	1,564
Other organic chemicals	3,402	3,777	4,231	3,963	4,088
Imports $M					
Petrochemicals	907	1,067	1,155	985	892
Other organic chemicals	5,601	6,035	6,510	6,748	6,006

Commodity data

Statistics Canada reports production data for a limited number of organic chemicals (Table 22).

Table 22: Canadian production of specific organic chemicals, kilotonnes

	2011	2012	2013	2014	2015
Benzene	589	569	529	670	585
Toluene	241	236	258	229	175
Xylenes	241	273	293	381	350
Butadiene	215	209	234	216	219
Propylene	601	624	616	550	532
Formaldehyde	159	161	154	165	150

More data exists for imports and exports than for domestic production. Table 23 shows the exports for a select range of organic chemicals, in both tonnage and dollar value terms.

Table 23: Canadian exports of select organic chemicals

	Value, $M	Quantity, kt	Top markets
Benzene	87	103	USA 73% France 10% Spain 9% Netherlands 5%
Butadiene	110	85	USA 100%
Ethylene glycol	1,197	1,582	China 52% USA 47%
Higher olefins	223	180	USA 99% Italy 1%
Isopropyl alcohol	92	94	USA 99% Mexico 1%
Methanol	84	272	USA 100%
Propylene	245	242	USA 100%
Styrene	591	522	USA 100%

CIAC members producing petrochemicals and organic chemicals in Canada

- Akzo Nobel Chemicals Ltd.
- ARLANXEO Canada Inc.
- BASF Canada
- BioAmber Inc.
- Chemtura Canada Co./Cie
- Dow Chemical Canada ULC
- Evonik Oil Additives Canada Inc.
- H.L. Blachford Ltd.
- Imperial
- INEOS Canada Partnership
- Jungbunzlauer Canada Inc.
- MEGlobal Canada ULC

- Methanex Corporation
- NOVA Chemicals Corporation
- PCAS Canada Inc.
- Shell Chemicals Canada
- Stepan Canada Inc.
- W.R. Grace Canada Corp.

b. Inorganic chemicals

Statistics Canada reports data on inorganic chemicals as part of basic chemicals within NAICS 32518. Under this category there are two sub-industry classifications:

- NAICS 325811 – Alkali and chlorine
- NAICS 325819 – Other inorganic chemicals.

Since 2010, shipment and employment data have been suppressed at the 6-digit NAICS level and only reported at the 5-digit level.

The main inorganic chemicals produced by CIAC members in Canada are: chlorine, sodium hydroxide, hydrochloric acid, hydrogen peroxide, sodium chlorate, sodium silicates, sulphuric acid, and titanium dioxide.

Table 24: Principal statistics for inorganic chemicals

	2012	2013	2014	2015	2016
Establishments					
Chlor-alkali	7	8	9	6	7
Other inorganic chemicals	117	130	133	129	132
Shipments $M	4,114	4,518	4,172	4,224	4,131
Employment, 000	4,475	4,799	5,133	5,457	5,455
Exports $M[6]					
Chlor-alkali	134	153	101	90	90
Other inorganic chemicals	3,875	4,047	3,606	4,086	3,869
Imports $M					
Chlor-alkali	327	325	328	374	402
Other inorganic chemicals	2,312	2,309	2,075	2,111	1,971

[6] Exports sometimes exceed shipments due to different databases used to collect the two sets of data.

Commodity data

Statistics Canada reports production data for a limited number of inorganic chemicals (Table 25).

Table 25: Canadian production of specific inorganic chemicals, kilotonnes

	2011	2012	2013	2014	2015
Carbon black	233	224	221	241	219
Chlorine	567	550	600	510	442
Hydrogen peroxide	225	217	225	240	247

More data exists for imports and exports than for domestic production.

Table 26: Canadian exports of select inorganic chemicals

	Value, $M	Quantity, kt	Top markets
Chlorine	41	182	USA 100%
Hydrochloric acid	22	160	USA 98% Netherlands 1%
Hydrogen peroxide	55	95	USA 100%
Sodium chlorate	434	596	USA 84% Japan 7% Australia 2% Chile 2%
Sodium hydroxide	48	47	USA 100%
Sodium silicate	11	19	USA 94% UK 2% Taiwan 2%
Sulphuric acid	136	2,256	USA 99% Morocco 1%
Titanium dioxide	11	4	Belgium 64% India 8% USA 7%

CIAC members producing inorganic chemicals in Canada

- Akzo Nobel Chemicals Ltd.
- Arkema Canada Inc.
- Axiall Canada Inc.
- CCC Sulphur Products
- Chemtrade
- ERCO Worldwide
- Evonik Canada Inc.
- KRONOS Canada Inc.
- National Silicates
- NorFalco Sales Inc., GLENCORE Canada Corporation
- Olin Canada ULC
- PeroxyChem Canada
- Solvay Canada Inc.
- W.R. Grace Canada Corp.

c. Synthetic resins, rubbers and fibres

There are two industry sub-groups within this classification:

- NAICS 32521 – Synthetic resins and rubbers
- NAICS 32522 – Synthetic fibres.

Since 2013, shipment and employment data have been suppressed at the 5-digit NAICS level and only reported at the 4-digit level.

The main synthetic resins and rubbers produced in Canada are polyethylene, ethylene vinyl acetate, polystyrene, PVC, polyacrylamides, PET, nylons, urea and phenol formaldehydes, latex emulsions, unsaturated polyesters, silicones, and butyl and halobutyl rubbers. Synthetic fibres are produced in Canada using a variety of domestically-produced and imported resins.

Table 27: Principal statistics for synthetic resins rubbers and fibres

	2012	2013	2014	2015	2016
Establishments					
Synthetic resins and rubbers	144	133	127	121	117
Synthetic fibres	27	25	33	30	25
Shipments $M	8,240	9,003	9,546	9,792	9,514
Employment, 000	6,613	5,987	5,341	4,715	4,590
Exports $M					
Synthetic resins and rubbers	6,333	7,073	7,945	8,143	7,929
Synthetic fibres	436	400	367	391	370
Imports $M					
Synthetic resins and rubbers	6,857	6,950	7,880	8,044	8,030
Synthetic fibres	555	536	564	607	583

• Commodity data

Within these industries, Statistics Canada reports production data only for polyethylene (Table 28).

Table 28: Canadian production of synthetic resins, kilotonnes

	2011	2012	2013	2014	2015
Polyethylene	3,226	3,186	3,503	3,407	3,641

Table 29: Canadian exports of select synthetic resins and rubbers

	Value, $M	Quantity, kt	Top markets
Butyl and halobutyl rubbers	294	100	USA 41% China 28% South Korea 9%
Polyethylene	5,347	3,374	USA 88% Mexico 5% China 3%

- **CIAC members producing synthetic resins, rubbers and fibres in Canada**

  - ARLANXEO Canada Inc.
  - BASF Canada
  - Dow Chemical Canada ULC
  - Imperial
  - NOVA Chemicals Corporation

d. Specialty chemicals

This profile is different from the others in the series. There is no Statistics Canada aggregation that provides data for an industry called specialty chemicals. Therefore, a number of assumptions have been made to derive an approximation for the size of this industry grouping.

Examples of the types of specialty chemicals produced by CIAC members include: fatty acids, maleic anhydride, plasticizers, citric acid, photochemicals, and additives for lubricants, plastics and rubber.

- Assumption #1: Specialty chemicals are a subset of NAICS 32519 – Other organic chemicals. Very little, if any, specialty chemicals fall within the petrochemical industry as it is comprised primarily of commodity products. For this analysis it is assumed that inorganic chemicals and synthetic resins and rubbers can also be excluded.

- Assumption #2: The ratio of specialty chemical to commodity chemical exports can be used to estimate the value of shipments and employment attributable to specialty chemicals. This assumption allows the use of relatively-detailed trade data to gain a measure of the level of specialty chemical production in Canada. However, deciding which products are commodity versus which are specialty remains subjective.

There are about 15 facilities in Canada producing ethanol that are captured within the other organic chemical industry. Since ethanol is primarily used for fuel, these facilities are not considered part of specialty chemicals.

Estimated statistics for the total other organic chemicals industry and the specialty component are shown in Table 30. The data for the other organic chemicals industry includes both commodity and

specialty chemicals, and is repeated from the Petrochemicals profile. It is presented again to provide an indication of the relative size of the commodity versus specialty element of the industry.

Table 30: Estimated principal statistics for specialty chemicals

	2012	2013	2014	2015	2016
Establishments					
Other organic chemicals	135	135	135	140	133
Specialty chemicals	115	115	115	120	115
Shipments $M					
Other organic chemicals	4,039	4,138	4,030	4,564	5,038
Specialty chemicals	1,890	1,830	1,660	1,880	2,170
Employment, 000					
Other organic chemicals	2,297	2,698	3,110	3,511	3,510
Specialty chemicals	1,070	1.190	1,280	1,450	1,510
Exports $M					
Other organic chemicals	3,402	3,777	4,231	3,963	4,088
Specialty chemicals	1,590	1,670	1,745	1,664	1,758
Imports $M					
Other organic chemicals	5,601	6,035	6,510	6,748	6,006
Specialty chemicals	2,590	2,650	2,685	2,824	2,583

• Commodity data

Table 31 shows the exports for a select range of specialty chemicals, in both tonnage and dollar value terms in 2014.

Table 31: Canadian exports of select specialty chemicals

	Value, $M	Quantity, kt	Top markets
Palmitates and stearates	8.9	5.2	USA 93% China 2%
Dinonyl or didecyl orthophthalates	4.0	1.9	USA 98% UK 1%
Azo compounds	2.7	0.04	USA 72% Japan 18% Netherlands 6%
Cyanine dyes	43.8	2.9	USA 100%
Azo dyes	6.4	0.2	USA 89% Switzerland 4% China 3%
Other fatty acids	10.6	11.6	USA 94% Malaysia 2%

- **CIAC members producing specialty chemicals in Canada**
  - Akzo Nobel Chemicals Ltd.
  - BASF Canada
  - Chemtura Canada Co./Cie
  - Evonik Oil Additives Canada Inc.
  - H.L. Blachford Ltd.
  - Imperial
  - Jungbunzlauer Canada Inc.
  - PCAS Canada Inc.
  - Stepan Canada Inc.
  - W.R. Grace Canada Corp.

CHEMISTRY INDUSTRY
ASSOCIATION OF CANADA

805 - 350 Sparks Street, Ottawa, ON K1R 7S8 | 613-237-6215

canadianchemistry.ca | @ChemistryCanada

info@canadianchemistry.ca

Responsible Care®
Our commitment to sustainability.